

## **Comparism Study between Doing or Not of Purse String, Peritoneal Suturing &Cauterization of the Appendicular Stump after Appendectomy in Early and Late Post-Operative Complications**

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### **ABSTRACT**

The appendix averages 11 cm in length but can range from 2 to 20 cm. The diameter of the appendix is usually between 7 and 8 mm, the human appendix is considered a vestigial structure, acute appendicitis is the commonest cause of acute abdominal pain in the world and appendectomy is the commonest abdominal operation. Acute appendicitis occurred due to obstruction of the appendicular lumen producing a close loop with resultant inflammation that can lead to necrosis and perforation. The surgical removal of the vermiform appendix is called an appendectomy, either by laparotomy or laparoscopy. Untreated the inflamed appendix may rupture, leading to peritonitis, followed by shock, and, if still untreated, death may occur. This study was carried out in Al-Hussein hospital in Nissirri city through one year period from April 2004 to March 2005 on 360 patients, 165 males and 195 females, ages range between 10-45 years. 60 patients appendectomy with purse string to the stump of appendix, 60 patients without purse string, 60 patients with cauterized the edge of the stump other 60 patients without, 60 patients with suturing of peritoneum during closure of abdomen other 60 patients without. Using same surgical suture material to all patients, The aim of this study was to see the value of purse string procedures, cauterizing the edge of appendicular stump, suturing of peritoneum in incidence of post-operative complications (early and late complication). There is no significant difference in form of early & late postoperative complications whether performed purse string to the base of appendix after appendectomy or noting addition it may be had a harmful effect on the wall of caecum, also did not need to suture the peritoneum but cauterize the edge of stump decreased the incidence of post-operative complication especially wound infection and intestinal obstruction due to adhesion.

**Key Words:** Appendectomy, Purse String Suture.

### **INTRODUCTION**

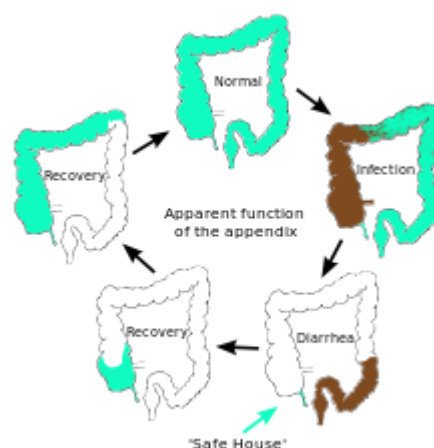
The appendix averages 11 cm in length but can range from 2 to 20 cm. The diameter of the appendix is usually between 7 and 8 mm. The longest appendix ever removed measured 26 cm from a patient in Zagreb, Croatia.<sup>[1]</sup> The appendix is located in the right lower quadrant of the abdomen, near the right hip bone.<sup>[2]</sup> Its position within the abdomen corresponds to a point on the surface known as McBurney's point. While the base of the appendix is at a fairly constant location, 2 cm below the ileocecal valve, the location of the tip of the appendix can vary from being retrocecal (behind the cecum) (74%) to being in the pelvis to being extra peritoneal.<sup>[3]</sup> In rare individuals with situs inversus, the appendix may be located in the lower left side. The human appendix is a structure that has lost all or most of its original function through the process of evolution. The vermiform appendage is the shrunken remainder of the cecum that was found in a remote ancestor of human's ceca, which are found in the digestive tracts of many extant herbivores, house mutualistic bacteria which help animals digest the cellulose molecules that are found in plants<sup>[4]</sup>. As the human appendix no longer houses a significant number of these bacteria, and humans are no longer capable of digesting more than a minimal amount of cellulose per day,<sup>[5]</sup> the human appendix is considered a vestigial structure. This interpretation would stand even if it were found to have a certain use in the human body. Vestigial organs are sometimes pressed into a secondary use when their original function has been lost<sup>[6]</sup>, the sections below for possible functions of the appendix that may have evolved more recently after the appendix lost its original function. A possible scenario from a fully functional cecum to the current human appendix was put forth

by Charles Darwin.<sup>[7]</sup> He suggested that the appendix was used for digesting leaves as primates. It may be a vestigial organ, evolutionary baggage, of ancient humans that has degraded down to nearly nothing over the course of evolution. The very long cecum of some herbivorous animals, such as found in the horse or the koala, supports this theory. The koala's cecum enables it to host bacteria that specifically help to break down cellulose. Human ancestors may have also relied upon this system when they lived on a diet rich in foliage. As people began to eat more easily digested foods, they became less reliant on cellulose-rich plants for energy. As the cecum became less necessary for digestion, mutations that were previously deleterious (and would have hindered evolutionary progress) were no longer important, so the mutations have survived. These alleles became more frequent and the cecum continued to shrink. After thousands of years, the once-necessary cecum has degraded to be the appendix of today.<sup>[7]</sup> On the other hand, evolutionary theorists have suggested that natural selection selects for larger appendices because smaller and thinner appendices would be more susceptible to inflammation.<sup>[8]</sup>

### Possible functions

#### \*Immune function

Some scientists have recently proposed that the appendix may harbor and protect bacteria that are beneficial in the function of the human colon.<sup>[9]</sup> Loren G. Martin, a professor of physiology at Oklahoma State University, argues that the appendix has a functioning role in fetuses and adults.<sup>[10]</sup> Endocrine cells have been found in the appendix of 11-week-old fetuses that contribute to "biological control (homeostatic) mechanisms." In adults, Martin argues that the appendix acts as a lymphatic organ. The appendix is experimentally verified as being rich in infection-fighting lymphoid cells, suggesting that it might play a role in the immune system. Zahid suggests that it plays a role in both manufacturing hormones in fetal development as well as functioning to "train" the immune system, exposing the body to antigens so that it can produce antibodies. He notes that doctors in the last decade have stopped removing the appendix during other surgical procedures as a routine precaution, because it can be successfully transplanted into the urinary tract to rebuild a sphincter muscle and reconstruct a functional bladder.<sup>[11]</sup>



**Figure 1. Maintaining gut flora**

Possible function of the human vermiform appendix as a "safe house" for beneficial bacteria in the recovery from diarrhea. Although it was long accepted that the immune tissue, called gut associated lymphoid tissue, surrounding the appendix and elsewhere in the gut carries out a number of important functions, explanations were lacking for the distinctive shape of the appendix and its apparent lack of importance as judged by an absence of side effects following appendectomy.<sup>[12]</sup> William Parker, Randy Bollinger, and colleagues at Duke University proposed

that the appendix serves as a haven for useful bacteria when illness flushes those bacteria from the rest of the intestines.<sup>[9][13]</sup> This proposal is based on a new understanding of how the immune system supports the growth of beneficial intestinal bacteria,<sup>[14][15]</sup> in combination with many well-known features of the appendix, including its architecture, its location just below the normal one-way flow of food and germs in the large intestine, and its association with copious amounts of immune tissue. Research performed at Winthrop University-Hospital showed that individuals without an appendix were four times more likely to have a recurrence of *Clostridium difficile*.<sup>[16]</sup> However, other research showed that there is a significantly greater rate of *C. difficile* infection among people with an appendix, with more than 80% of the infections occurring among patients with an intact appendix.<sup>[17]</sup> Such function may be useful in a culture lacking modern sanitation and healthcare practice, where diarrhea may be prevalent.<sup>[13]</sup> Current epidemiological data show that diarrhea is one of the leading causes of death in developing countries [18]. Acute appendicitis is the commonest cause of acute abdominal pain in the world and appendectomy is the commonest abdominal operation.<sup>[24]</sup> Acute appendicitis occurs due to obstruction of the appendiceal lumen producing a closed loop with resultant inflammation that can lead to necrosis and perforation. The most common causes of obstruction are 1- fecolith 35% 2- lymphoid hyperplasia 60%. Following obstruction, mucus continues to be secreted into the lumen, stasis leads to bacterial proliferation and secretion of toxins that enable organisms to penetrate the wall of the appendix and establish inflammation, increased intraluminal pressure leads to impeded venous/arterial flow and, ultimately, necrosis and gangrene.<sup>[25]</sup> Clinical features of appendicitis are periumbilical pain followed by anorexia, nausea, and vomiting, unlike gastroenteritis pain precedes vomiting. Pain later migrates to the right lower quadrant, where it becomes more intense and localized because of local peritoneal irritation. Maximal tenderness occurs in McBurney's point (point located one third of the way on the line drawn from the anterior superior iliac spine to the umbilicus).<sup>[25]</sup> Main signs are flushed face, furred tongue with fetor, tachycardia.<sup>[26]</sup> Main differential diagnoses are mesenteric adenitis, Meckel's diverticulitis, chronic ileitis, right ureteric colic, right pyelonephritis, acute salpingitis, ovulation pain, ruptured ectopic pregnancy, acute cholecystitis, carcinoma of caecum, acute pancreatitis.<sup>[26]</sup>

### Aim of study

1. To compare the effect of doing or not purse string, suturing of the peritoneum and cauterizing the edge of the stump after appendectomy in early and late post operative complication.
2. to assess the incidence of appendicitis in our city.

### PATIENTS AND METHODS

This study was carried out in Al-Hussein hospital in Nasiriyah city throughout a one year period from April 2004 to March 2005 on 360 patients 165 male and 195 female, ages range between 10 - 45 years. 60 patients appendectomy with purse string to the stump of appendix, 60 patients without purse string, 60 patients with cauterized the edge of the stump other 60 patients without, 60 patients did suturing of peritoneum during closure of abdomen other 60 without using same surgical suture material to all patients, same antibiotic in type and duration. After confirming the diagnosis we take consent of operation, explain to the patients or parents operation and post operative complications that may occur, we open abdomen through gridiron incision in layers till reach the appendix we did appendectomy so whether did purse string or not, suturing peritoneum or not, cauterizing the edge of stump or not, we did these procedures randomly. Then closed abdomen in layers [ cases of perforated appendices were excluded from the study ] and we discharge most of patients in 2<sup>nd</sup> post operative except some patients who get some complication. Then start for follow up for 6 years to detect any early and late complication and compare between 2 groups.

## RESULTS

From our study we compares between two groups (with peruse string) and (without peruse string), between cauterized and non cauterized edge of the stump groups, between suturing the peritoneum and not suturing, in early and late post operative complication. Our results are;

\*With or without pursue string.

### EARLY COMPLICATIONS:

- 1- wound infection group A (with pursue string) 7 patients (11.6%) while group B (without) 6 patients (10%).
- 2- paralytic ileus group A 4 patients (6.6%) while group B 5 patients (8.3%).
- 3- intraabdominal abscess (pelvic abscess) group A 3 patient (5%), group B 2 patient also (3.3%).
- 4- stitch granuloma in group A 8 (13.3%) in group B 7 patients (11.6%).
- 5- fecal fistula group A 1 (1.6%) and group B 1 PATIENTS (1.6%).

### LATE COMPLICATIONS

1. intestinal obstructions due to adhesions related to previous appendectomy group A 4 PATIENTS (6.6%) AND GROUP B 3 PATIENTS (5%).
2. RT inguinal hernia in group A 2 patients (3.3%) while in group B 3 patients (5%) SO from our study we did not see any significant differences between two groups in early and late post operative complications. Result for do cauterizing the edge or not we get these results.

\*cauterizing of the edge or not.

### EARLY COMPLICATIONS

- 1- wound infection group A (cauterize the edge) 2 patients (3.3%) while group B (with out) 6 patients (10%).
- 2- paralytic ileus group A 4 patients (6.6%) while group B 5 patients (8.3%)
- 3- intraabdominal abscess (pelvic abscess) group A 3 patient (5%), group B 2 patient also (3.3%).
- 4- stitch granuloma in group A 8 (13.3%) in group B 7 patients (11.6%)
- 5- fecal fistula group A 1 (1.6%) and group B 1 PATIENTS (1.6%).

### LATE COMPLICATIONS

1. intestinal obstructions due to adhesions related to previous appendectomy group A 1 PATIENTS (1.6%) AND GROUP B 4 PATIENTS (6.6%).
2. RT inguinal hernia in group A 2 patients (3.3%) while in group B 3 patients (5%), so from these result we see that we preferred to do cauterizing the edge to decrease incidence of post operative wound infection and late post operative complication.

\*Suturing of the peritoneum or not

### EARLY COMPLICATIONS

- 1- wound infection group A (suturing of peritoneum) 5 patients (8.3%) while group B (without) 4 patients (6.6%).
- 2- paralytic ileus group A 2 patients (3.3%) while group B 3 patients (5%)
- 3- intraabdominal abscess (pelvic abscess) group A 3 patient (5%), group B 2 patient also (3.3%)
- 4- stitch granuloma in group A 5 (8.3%) in group B 4 patients (6.6%)
- 5- fecal fistula group A 1 (1.6%) and group B 1 PATIENTS (1.6%).

### LATE COMPLICATIONS

- 1- intestinal obstructions due to adhesions related to previous appendectomy group A 2

PATIENTS (3.3%) AND GROUP B 3 PATIENTS (5%).

2- RT inguinal herniain group A 1 patients (1.6%) while in group B 1 patients (1.6%);  
We did not see any significant differences between two groups in early and late post operative complications.

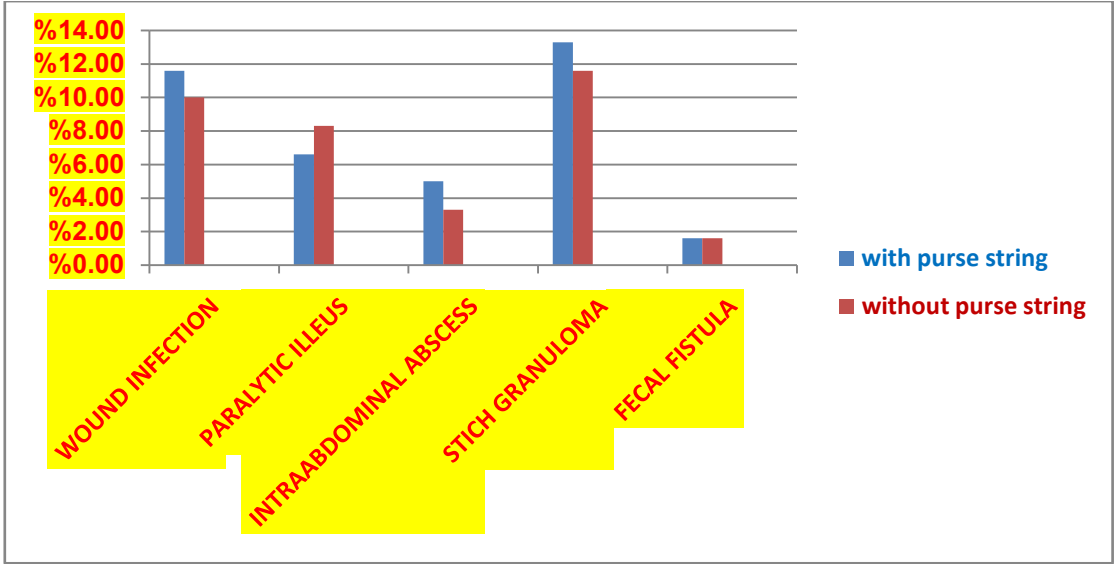


Figure 2.EARLY COMPLICATIONS OF APPENDICICTOMYwith or without pursue string

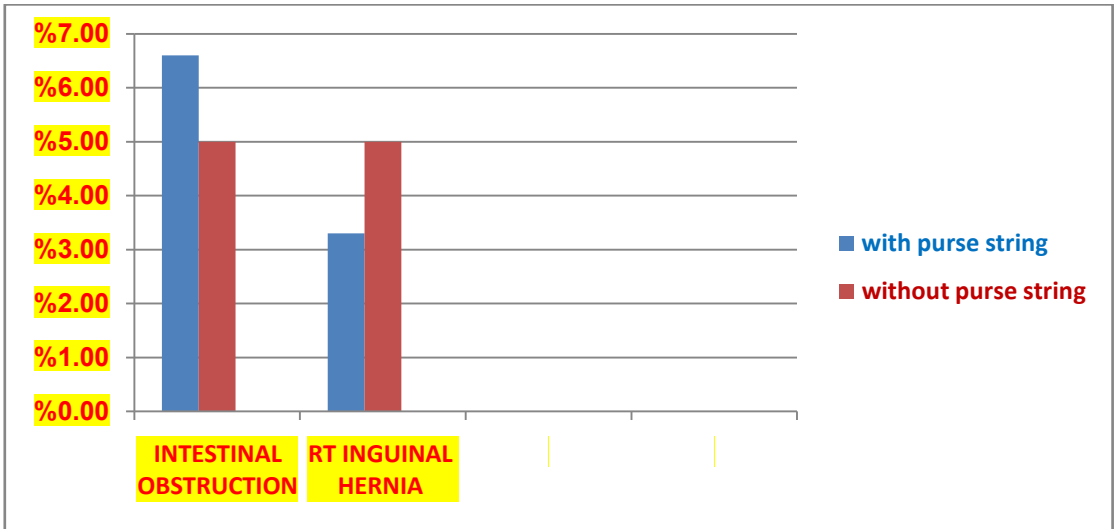


Figure 3.LATE COMPLICATIONS OF APPENDICICTOMYwith or withoutpursue string

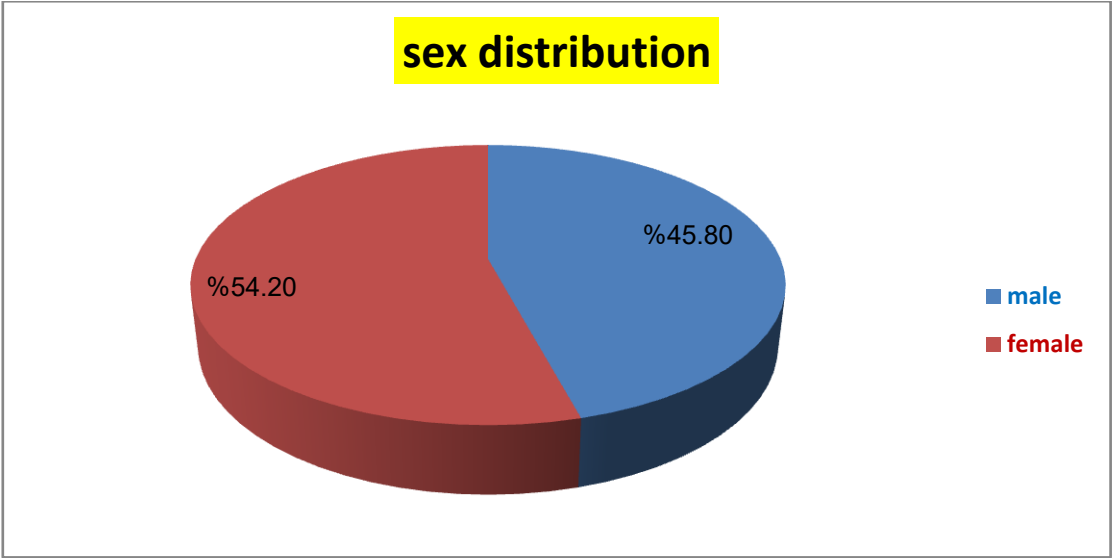


Figure 4. Show Sex distribution

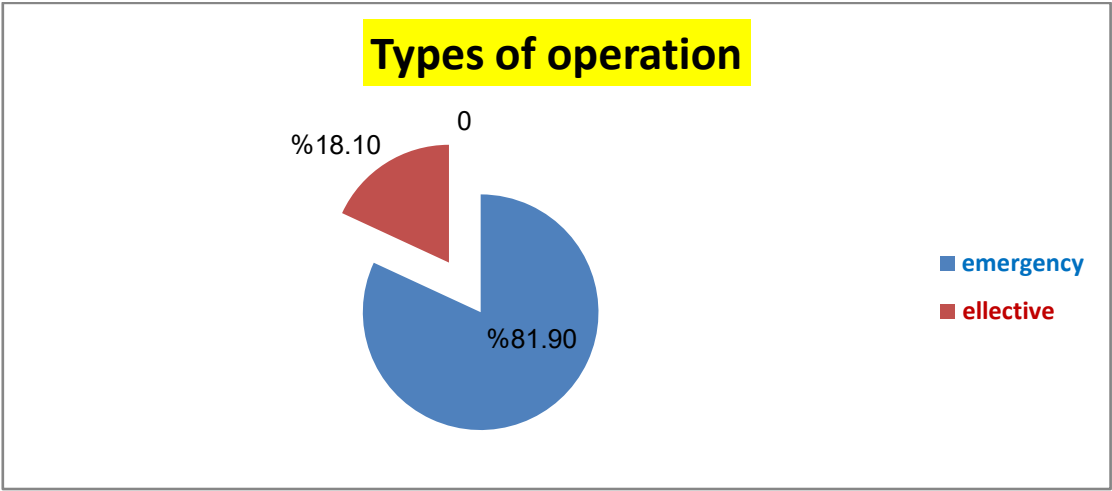


Figure 5. Show Types of Operation

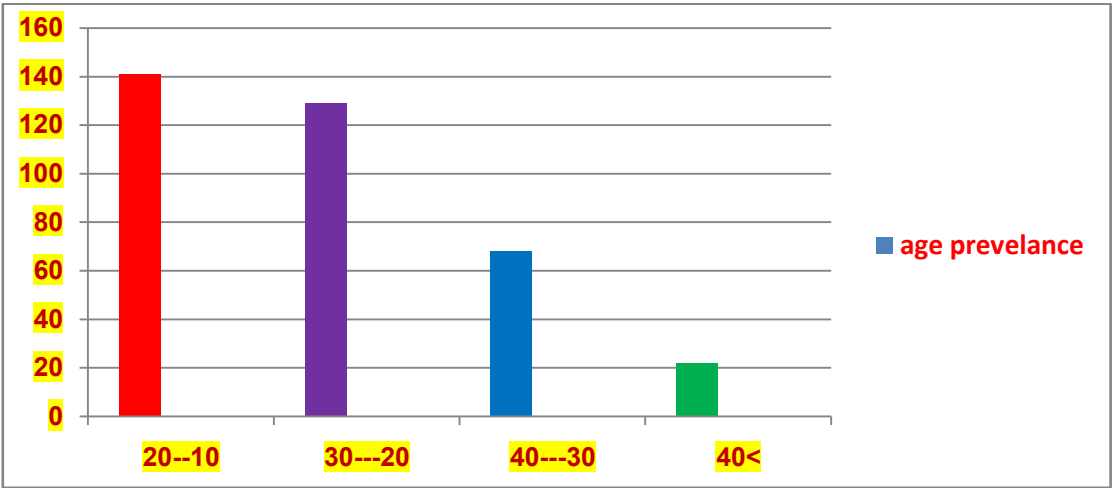
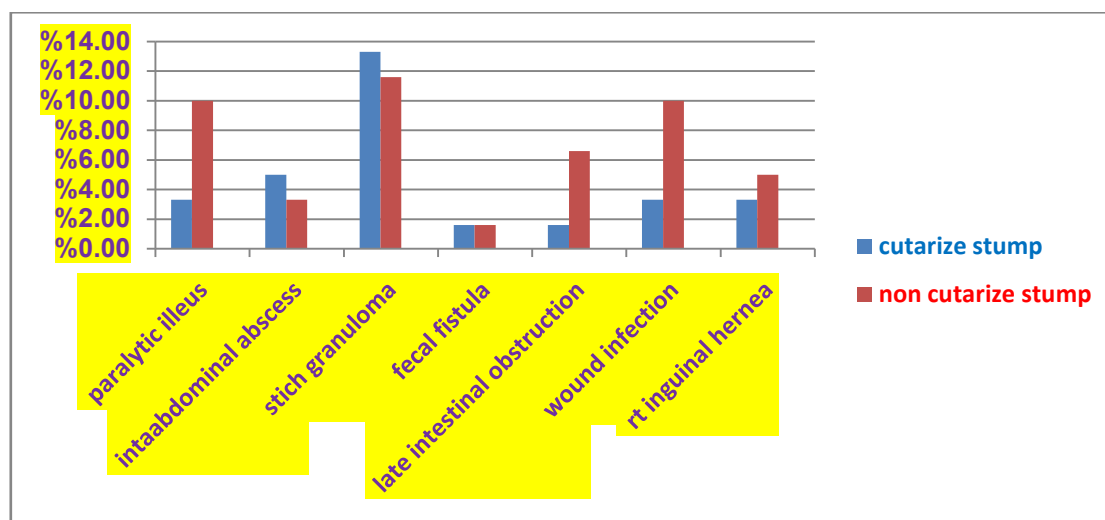
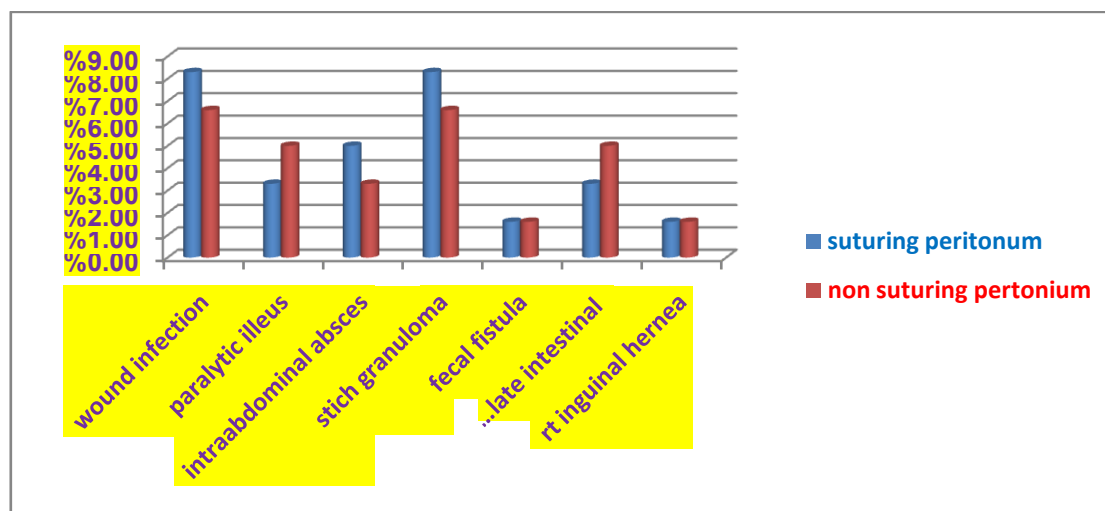


Figure 6. Show Age prevalence



**Figure 7. Show Incidence of complications WITH OR WITHOUT cauterization OF the stump.**



**Figure 8. Show Incidence of complications WITH OR WITHOUT suturing the peritoneum**

## DISCUSSION

From this study females were more often affected than males, 10-20 years were common victims, emergency appendectomy was commonest operation 81.9% . Previously peruse string performed to all stumps of appendices after appendectomy in order to prevent post operative intestinal obstruction due to raw area of the stump or leakage from the stump but from this study we see no significant differences whether do peruse string or not to the stump of the appendix after appendectomy in both early and late post operative complications .so we prefer to not do a peruse string because it time consuming and may be produce iatrogenic trauma to the caecal wall. Also we found that there is no significant difference in suturing peritoneum or not ,we found that cauterizing of the stump is benefit for reducing incidence of wound infection and postoperative intestinal complication(late complication).

## CONCLUSION

There is no significant difference in & late post operative complications whether perform purse string to the base of appendix after appendectomy or not in addition it may be had a harmful effect on the wall of caecum , also did not need to suture the peritoneum but cauterize the edge of stump decreased the incidence of post operative complication especially wound infection and intestinal obstruction due to adhesion.

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